

California Regional Water Quality Control Board
North Coast Region

CEASE AND DESIST ORDER NO. R1-2000-##*

Requiring the Pacific Lumber Company, the Scotia Pacific Company LLC,
and Salmon Creek Corporation to Cease and Desist
From Discharging or Threatening to Discharge Waste to Bear Creek
In Violation of the Water Quality Control Plan for the North Coast Region

The California Regional Water Quality Control Board, North Coast Region (hereinafter Regional Water Board), finds that:

1. The Pacific Lumber Company, the Scotia Pacific Company LLC, and Salmon Creek Corporation, all subsidiaries of MAXXAM, Inc., (hereinafter collectively referred to as the Discharger) together own approximately 95% (~4850 acres) of the 5,120 acre Bear Creek watershed. Bear Creek watershed is tributary to the Eel River, approximately nine stream miles upstream of the town of Scotia.
2. The Discharger conducts timber harvesting, forestry management, road construction and maintenance, and related activities on the lands of the Bear Creek within its ownership (hereinafter referred to as the Bear Creek ownership).
3. According to information obtained from the California Department of Forestry and Fire Protection (CDF), over the period from 1988 to 1997, the Discharger conducted timber harvesting activities throughout the Bear Creek ownership at an average rate of 241 acres (~5% of the Bear Creek ownership) per year, removing timber from approximately 2,412 acres, or ~50% of the Bear Creek ownership.
4. During the winter of 1996-1997, numerous landslides occurred in the Bear Creek ownership, discharging significant quantities of sediment to Bear Creek and the tributaries thereto, resulting in impacts to the beneficial uses of water, including, but not limited to, cold freshwater habitat, as verified by Regional Water Board staff inspections on July 28, 1997 and August 23, 1997 (Regional Water Board staff September 1, 1997 inspection report), and California Department of Fish and Game (DFG) staff in an August 29, 1997 inspection (DFG October 18, 1997 inspection report). Subsequent investigation demonstrated that many of these landslides were associated with timber harvesting and related activities (see findings 10. and 11., below).
5. From January 1995 through August 1998, CDF issued 54 violations of the California Forest Practice Rules Sections 914.2, 914.6, 916.3, 916.4, 916.7, 917.3, 923.1, 923.4, 923.5, 923.6, 923.8, 1035.3(d) to the Discharger for timber harvest operations within the Eel River watershed. The Bear Creek watershed is a subwatershed of the Eel River watershed. A number of these violations of the California Forest Practice Rules resulted in discharges and threatened discharges of soil from smaller watersheds, such as Bear Creek watershed and its tributaries, and may be considered to be threatened violations of the waste discharge prohibitions contained in the Water Quality Control Plan for the North Coast Region (Basin Plan). In such cases, the Basin Plan directs the Executive Officer to take appropriate action, including the issuance of a Cease and Desist Order.

6. In response to discharges and threatened discharges of sediment to Bear Creek resulting from the landslides on the Bear Creek ownership, the Regional Water Board's Executive Officer required on October 23, 1997, pursuant to Water Code Section 13267(b), that the Discharger submit:
 - i. A sediment budget and inventory for the Bear Creek ownership.
 - ii. A protocol for mitigating sediment production from future timber harvest activities by controlling sediment delivery identified in the sediment budget and inventory.
 - iii. A monitoring program for the Bear Creek watershed to track the changes in stream morphology, fishery habitat, and water quality while the sediment control strategy is implemented in the watershed.
 - iv. A time schedule for development and implementation of the sediment budget and control strategy and the monitoring plan.
7. On November 25, 1997, Pacific Watershed Associates (PWA) submitted, on behalf of the Discharger, a response to the Regional Water Board's Executive Officer's 13267(b) requirement, proposing to 1) develop a modified "sediment budget" and inventory of sediment sources for the Bear Creek watershed; 2) develop a "protocol" or plan for mitigating or preventing sediment production from sediment sources identified in the field inventory; 3) develop a monitoring program to track changing resource conditions in the Bear Creek watershed during implementation of mitigation and prevention efforts; and 4) prepare a time schedule for development and implementation of items 1) through 3), above.
8. On December 16, 1997, representatives of CDF, California Department of Fish and Game, California Division of Mines and Geology, and Regional Board staff met, at the request of the CDF director, to discuss cumulative watershed effects in Bear Creek, Jordan Creek, Stitz Creek, Freshwater Creek, and Elk River. During the meeting, the group reached a consensus that Bear Creek had significant adverse cumulative watershed impacts, with timber harvesting a contributing factor. DFG representatives reported at the meeting that they had found that habitat for fish had been "essentially erased" in Bear Creek. CDF representatives documented the meeting with minutes. (Cumulative Watershed Effects Meeting Agency Review meeting minutes). In addition, DFG's October 8, 1997 inspection report, which was considered at the December 16, 1997 meeting, stated that "Bear Creek's anadromous fish habitat is currently severely and thoroughly impacted."
9. In a February 11, 1998 letter, the CDF stated that Bear Creek had suffered severe aggradation during the 1996-1997 winter, which had led to the elimination of, or a significant decline of, habitat recently used by some fish species. In addition, CDF stated that Bear Creek was significantly cumulatively impacted due to sediment, and requested that the Discharger provide an acceptable watershed analysis, as outlined in the Regional Water Board's October 23, 1997 letter, before CDF would approve any Timber Harvest Plans in the Bear Creek watershed.
10. On April 17, 1998, the Discharger submitted a report titled *Sediment Source Investigation and Sediment Reduction Plan for the Bear Creek Watershed, Humboldt County, California* (PWA report), in response to the Regional Water Board's Executive Officer's October 23, 1997 13267(b) requirement. The PWA report concluded that "both road construction and

harvesting have been linked to increased sediment production and yield in Bear Creek.” The report noted that approximately 52% of the sediment generated during the 1996/97 storm events remained in the main stem and tributary stream channels of Bear Creek, with the remaining 48% having been remobilized and flushed to the Eel River. In addition, the report indicated that 74% (277,900 cubic yards) of the 1994-1997 sediment delivery to the stream network originated from non-road-related debris landsliding, 8.3% (31,500 cubic yards) originated from torrent track scour (channelized debris flow), 3.7% (14,100 cubic yards) originated from bank erosion, and 14% (54,000 cubic yards) originated from road-related erosion.

The PWA report proposed an implementation plan consisting of erosion control and erosion prevention along 39 miles of road in the Bear Creek ownership at 156 sites; a landslide prevention and avoidance plan employing the Mass Wasting Avoidance Strategy (MWAS), as described in the Interim Aquatic Strategy for the Discharger’s Habitat Conservation Plan (HCP), for future forest management activities; and a monitoring plan to document and track the physical and biological recovery of Bear Creek. The monitoring plan did not include a water quality component.

11. At the request of Regional Water Board staff, Dr. Leslie Reid of the Redwood Sciences Laboratory reviewed and commented on the PWA report in a June 18, 1998 fax (**Attachment 1**). Using information contained in the PWA report, Dr. Reid demonstrated that in order to maintain annual inputs of sediment to the Bear Creek watershed at or below 20% over background (an amount derived from the Basin Plan’s water quality objective for turbidity that represents a very conservative approach for estimating the level of sediment that the watershed can process), annual tree removal within the watershed should be limited to no more than 1.5% of total watershed area (76.8 acres). This suggested annual harvest rate is generous, in that it assumes that there are no sediment inputs from other sources, such as roads or past landslides, and that the watershed has recovered from the effects of past sediment inputs. It should also be noted that the suggested harvest rate assumes the use of lower impact silvicultural methods (such as selective harvest rather than clearcut, non-ground based yarding methods, etc.) and avoidance of mass wasting areas of concern, as defined in HCP. Finally, it should be noted that this harvest rate does not automatically provide compliance with other water quality objectives set forth in the Basin Plan.

The Discharger owns 95% of the Bear Creek watershed (4,850 acres). 1.5% of 4,850 acres is 72.75 acres. Regional Water Board staff are investigating the ownership and activities of the owners of the remaining 5% (270 acres) of the watershed and will recommend appropriate actions based on their past and proposed future land use practices.

Dr. Reid’s analysis stated, in part, “The bottom line is that the [PWA] report demonstrates that present land-use practices are directly responsible for at least a 960% increase in landslide frequency, and that rates today are not substantially less than they were before forest practice rules were instituted. That original rates were “high” is essentially irrelevant; what is relevant is that land-use practices make them at least 9.6 times higher.”

Regarding the proposed MWAS, Dr. Reid noted in her analysis that “As it stands, it does not appear that the strategy will be capable of avoiding the kinds of failures documented in the Bear Creek report. The strategy depends on site-level inspections by a geologist. This

approach will not be successful unless a broader understanding of the allocations between landslides, site type, storm size, and silvicultural practices are first evaluated on the basis of a broad-scale analysis of landslides distribution. Once such a basis of understanding is established, it will be possible to more broadly prescribe appropriate silvicultural practices to avoid a repeat of the rates of landsliding evident throughout the area during both the first and second cycles of logging.”

12. In an October 8, 1998 letter, Regional Water Board staff requested that the Discharger implement the proposed road work as soon as possible, investigate and respond to Dr. Reid’s comments pertaining to the importance of silvicultural practices in retaining sufficient vegetation for slope stability, submit a hillslope monitoring plan, and submit a water quality monitoring plan, and provide a report evaluating silvicultural practices and landslides. In addition, staff expressed concern about use of the proposed MWAS in Bear Creek.
13. In a November 12, 1998 letter, the Discharger reported that the proposed road work was underway and would be completed within the next five years. In addition, the Discharger submitted a draft hillslope monitoring outline, and a monitoring outline which failed to include water quality monitoring. The Discharger disputed Dr. Reid’s conclusions, noting that the recently completed sediment source investigation for Jordan Creek indicated that landsliding was less common in recently harvested areas than in older stands. However, the Discharger’s January 28, 1999 report entitled *Sediment Source Investigation Reduction Plan for the Jordan Creek Watershed, Humboldt County, California*, prepared by Pacific Watershed Associates, indicates otherwise. This report actually documents a strong positive correlation between recent logging operations and slope failure in the Jordan Creek watershed, ranging from 1.5 to 4 times as many landslides on recently harvested slopes (harvested less than 15 years ago) as on slopes harvested more than 15 years ago. This report clearly demonstrates a connection between landslide incidence/sediment delivery volumes and rates of timber harvest and the intensity of management practices, noting that the higher rates of landsliding and landslide delivery in the 1960s may have been due to greater ground disturbance (tractor logging) and significantly more clearcutting.

Finally, the Discharger took issue with Regional Water Board staff’s concerns regarding use of the MWAS, stating that it specifies a program of management which should lead to markedly improved conditions within the Discharger’s watersheds.

14. In February 1999, the Discharger signed the Implementation Agreement with State and federal wildlife agencies to implement the HCP prepared pursuant to the Federal Endangered Species Act.
15. In an April 22, 1999 letter, Regional Water Board staff rejected the Discharger’s proposal to use the MWAS for timber harvest activities in the Bear Creek ownership until Watershed Analysis was completed for the watershed, noting that the MWAS would not be sufficient to prevent harvest related landslides. Regional Water Board staff again requested detailed instream and hillslope monitoring plans.
16. The MWAS is not sufficient to prevent harvest related landslides for a number of reasons, including the following.

- a. MWAS focuses on areas defined as mass wasting areas of concern (MWACs) by the HCP. However, failures also occur on slopes which do not meet the MWAC definition, including planar slopes and “break(s) in slope” (Reid 1998, from PWA report for Bear Creek; Reid 2000).
 - b. MWAS does not take into account the behavior of the landscape following vegetation removal, with the associated loss of root strength, increased moisture levels during storms, and rise in ground water elevations resulting from changes in evapotranspiration.
 - c. MWAS relies, in part, on the use of a model which makes generalized assumptions which are not field verified, and which expresses a level of risk which has not been field tested. Specifically, use of the MWAS model is not sufficient to predict/prevent harvest related landslides because it relies on a number of unvalidated assumptions which greatly oversimplify variability in watersheds and physical settings; model input data is not field verified, so the MWAS model is not calibrated to reflect site-specific characteristics; and, third, the Discharger has not provided any quantifiable and verifiable geologic analyses of the risk of hillslope failure resulting from timber harvest and related activities. This third deficiency is significant because “risk” is the probability that a hazard will cause loss of life or property, or another specified damage to natural resources, such as sediment delivery to a watercourse. In the watershed assessment module for the Freshwater Creek Watershed, the Discharger has indicated that calibrated slope failure runout models will not currently be used and therefore it is unclear how risk to any type of receptor from a hillslope failure will actually be determined.
17. Currently, the Discharger has seven timber harvest plans for the Bear Creek ownership, submitted in 1999 and 2000, which are either under review or have been approved such that harvest is currently underway. In total, these plans will remove trees from approximately 254 acres. This comprises approximately 5.2% of the Bear Creek ownership. Of the 254 acres, 219 acres, or 4.5% of the Bear Creek ownership, are to be clearcut. Under the plans, the Discharger will employ various yarding and site preparation methods, including those with high impacts (e.g., ground-based yarding, broadcast burning, winter operations) per the Discharger’s Sustained Yield Plan (approved February 28, 1999). The proposed rates of harvest would likely result in additional significant sediment discharges to Bear Creek and its tributaries that could further affect water quality. Interim prescriptions in the Discharger’s HCP will not provide sufficient protection to water quality in the Bear Creek watershed because neither the Sustained Yield Plan nor the HCP limit rates of harvest in specific subwatersheds.
18. In the absence of an evaluation from the Discharger regarding the relationship between silvicultural practices and landslides, Regional Water Board staff has recommended during timber harvest plan reviews that the Discharger employ low impact silvicultural prescriptions (e.g., selection), yarding techniques (e.g., full-suspension cable yarding), and site preparations (e.g., site preparation by hand), and that the Discharger limit winter activities to felling and helicopter yarding only in the Bear Creek ownership. The Discharger has not agreed to these recommendations.

19. The Discharger has not, to date, performed a Level 2 watershed analysis for the Bear Creek watershed, in which field data is collected to assess watershed conditions, causal mechanisms are evaluated, and site-specific and project-specific prescriptions are developed. Nor has the Discharger submitted an acceptable instream monitoring plan for water quality, as required by the Regional Water Board's Executive Officer's October 23, 1997 order pursuant to Water Code section 13267(b). The Discharger has conducted limited physical and biological monitoring activities for a short time period in Bear Creek, but these activities do not include monitoring for water quality objectives contained in the Water Quality Control Plan for the North Coast Region (Basin Plan). Monitoring for specific water quality objectives is necessary to quantify existing impacts to beneficial uses of water, to determine the effectiveness of erosion control activities, to measure recovery of impaired beneficial uses, and to assure that current and future timber harvest and related activities comply with Basin Plan water quality objectives and do not interfere with the recovery and protections of impaired beneficial uses. Water quality monitoring, as specified in this Order, should occur for the duration necessary to achieve the above-listed goals.
20. The Regional Water Board adopted a major rewrite of the Water Quality Control Plan for the North Coast Region (Basin Plan) on December 9, 1993. The State Water Resources Control Board, on March 21, 1994, and the Office of Administrative Law, on August 18, 1994, approved the Basin Plan. The Basin Plan was amended on March 24, 1994, June 22, 1995, and May 23, 1996. This Order is intended to implement existing terms of the Basin Plan.
21. Pursuant to the Basin Plan, including State Water Board Resolution 88-63, the existing and potential Beneficial Uses of the Eel River Hydrologic Unit, including Bear Creek and its tributaries, include agricultural water supply, domestic water supply, industrial service supply, cold freshwater habitat, ground water recharge, navigation, hydropower generation, warm freshwater habitat, rare, threatened, and endangered species habitat, commercial/sport fishing, estuarine habitat, water contact recreation, non-contact recreation, wildlife habitat, migration route for anadromous fish, fish spawning, reproduction, and/or early development, and aquaculture.
22. The Basin Plan's Action Plan for Logging, Construction, and Associated Activities includes the following prohibitions:
 - a. The discharge of soil, silt, bark, slash, sawdust, or other organic and earthen material from any logging, construction, or associated activity of whatever nature into any stream or watercourse in the basin in quantities deleterious to fish, wildlife, or other beneficial uses is prohibited.
 - b. The placing or disposal of soil, silt, bark, slash, sawdust, or other organic, and earthen material from any logging, construction, or associated activities of whatever nature at locations where such material could pass into any stream or watercourse in the basin in quantities which could be deleterious to fish, wildlife, or other beneficial uses is prohibited.

23. The Basin Plan's Guidelines for Implementation and Enforcement of Discharge Prohibitions Relating to Logging, Construction and Associated Activities identify, in part, the following narrative Water Quality Objectives from Section 3 of the Basin Plan as of particular importance in protecting Beneficial Uses from unreasonable effects due to discharges from logging, construction, or associated activities:
 - a. Turbidity shall not be increased more than 20 percent above naturally occurring background levels.
 - b. Waters shall not contain taste or odor-producing substances in concentrations that impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin, that cause nuisance or adversely affect the beneficial uses.
 - c. Waters shall not contain substances in concentrations that result in deposition of material that causes nuisance or adversely affects beneficial uses.
 - d. The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.
24. The Basin Plan also states that "controllable water quality factors shall conform to the Water Quality Objectives contained herein. When other factors result in the degradation of water quality beyond the levels or limits established herein as Water Quality Objectives, then controllable factors shall not cause further degradation of water quality. Controllable water quality factors are those actions, conditions, or circumstances resulting from man's activities that may influence the quality of the water of the State and that may be reasonably controlled." Controllable water quality factors include actions, conditions, and circumstances resulting from timber harvest activities. Due to the impaired condition of Bear Creek, any discharge or threatened discharge from timber harvest activities that are not reasonably controlled in the Bear Creek watershed are considered to be in quantities deleterious to the Beneficial Uses of Bear Creek and its tributaries in violation of the Basin Plan prohibitions. Bear Creek is within the Eel River watershed, which is 303(d)-listed as sediment and temperature impaired. Therefore, Bear Creek must be protected from further inputs of sediment and temperature impacts from controllable sources, and efforts must be made to restore the impaired beneficial uses of Bear Creek.
25. On April 23, 1998, the Regional Board adopted Resolution No. 98-45 adopting a schedule for the development of Total Maximum Daily Loads (TMDLs) and priority rankings for impaired waterbodies on the Clean Water Act Section 303(d) list. Waterbodies which are Section 303(d) listed as impaired must be protected from further inputs of the pollutant(s) of concern from controllable sources, and efforts must be made to restore the impaired beneficial uses. Bear Creek is within the Eel River watershed, which is 303(d)-listed as sediment and temperature impaired. Therefore, Bear Creek must be protected from further inputs of sediment and temperature impacts from controllable sources, and efforts must be made to restore the impaired beneficial uses of Bear Creek.
26. The Basin Plan's Guidelines for Implementation and Enforcement of Discharge Prohibitions Relating to Logging , Construction, and Associated Activities state:

“The Decision by the Executive Officer to recommend a cease and desist order hearing shall be made after consideration of the following factors:

1. The nature of the activity of the discharger.
2. The anticipated length of time the discharger will be carrying on the activity which results or threatens to result in a waste discharge.
3. The potential deleterious and unreasonable effect on beneficial uses of water during the time before the Regional Water Board will be able to take action on the violation of the prohibitions.
4. Other relevant factors considered applicable by the Executive Officer as necessary to bring before the Regional Water Board for their consideration and deliberation.”

The adoption of a Cease and Desist Order for the Bear Creek watershed is consistent with the directives of the Basin Plan.

27. The Implementation Agreement for the HCP states, in part, “notwithstanding any other provisions in this Agreement all activities undertaken pursuant to this Agreement, the HCP, or the Federal or State Permits must be in compliance with all applicable Federal and state laws and regulations,...” Thus, timber harvesting and related activities under the HCP and Implementation Agreement in the Bear Creek watershed are subject to state laws, such as the Porter-Cologne Water Quality Control Act and the Basin Plan.
28. The Discharger has discharged waste, particularly sediment, into waters of the State in violation of the Basin Plan prohibitions, and has caused or permitted waste to be discharged or deposited where it is, or probably will be, discharged into unnamed tributaries to Bear Creek and into Bear Creek, and has threatened to cause or permit waste to be discharged into unnamed tributaries to Bear Creek and into Bear Creek. Such waste has been and probably will continue to be discharged into the waters of the State, where it has created or threatened to create a condition of pollution or nuisance. Winter rainfall/runoff threatens to exacerbate the discharge unless and until the waste is cleaned up. The effects of the waste will also continue until the waste is cleaned up by the Discharger or flushed out by natural processes.
29. The Discharger is currently engaging in, and proposes to continue to engage in, further timber harvesting and related activities within the Bear Creek ownership which will result in additional discharges and threatened discharges of sediment into Bear Creek and its tributaries, causing further impairment of the Beneficial Uses of those waters than what has already occurred as a result of Discharger's past timber harvesting and related activities.
30. To assist in complying with Basin Plan Prohibitions for logging, construction, and associated activities and to reasonably control future landsliding, and to mitigate the accelerated landsliding identified in Findings 10. and 11, above, this Cease and Desist Order requires the Discharger to investigate and identify the causal mechanisms of accelerated landsliding, to remediate existing discharges from accelerated landslides, and to reasonably prevent future discharges from landslides to Bear Creek.

31. This enforcement action is being taken for the protection of the environment and to enforce provisions of the Basin Plan. Therefore, this enforcement action is exempt from the provisions of the California Environmental Quality Act (Public Resources Code, Section 21000 et seq.) under Section 15321, Chapter 3, Title 14, of the California Code of Regulations. In addition, CDF, in conjunction with the U.S. Fish and Wildlife Services (USFWS), prepared and certified a joint Final Environmental Impact Statement/Environmental Impact Report ("FEIS/FEIR") for the acquisition of certain Discharger-owned lands and the issuance of certain environmental plans and permits, including the HCP and Sustained Yield Plan, related to the Discharger's timber harvesting and related activities. The Regional Water Board, as a responsible agency under the California Environmental Quality Act (at Pub. Res. Code Section 21000 et seq.) (CEQA), has considered the FEIS/FEIR prepared by CDF and USFWS prior to approving this Order.
32. The Regional Water Board has notified the Discharger and interested agencies and persons of its intent to take this enforcement action, and has provided them with an opportunity for a public meeting and an opportunity to submit their written views and recommendations.
33. The Regional Water Board, in a public meeting held in the Arcata City Council Chambers in Arcata on November 16, 2000, heard and considered all comments pertaining to this enforcement action.

IT IS HEREBY ORDERED that, in accordance with Sections 13267(b) and 13301 of the California Water Code, the Discharger shall cease and desist from discharging or threatening to discharge wastes in violation of the Basin Plan in the Bear Creek watershed. The Discharger shall comply with following:

- I. Prior to commencing harvest on any Timber Harvest Plan in the Bear Creek watershed submitted on or after November 16, 2000, and not later than the deadlines included below, the Discharger shall prepare and submit the following information to the Regional Water Board:

A. Landslide Report

By no later than **January 15, 2001**, the Discharger shall submit a detailed report characterizing all landslides identified in the April 17, 1998 report titled *Sediment Source Investigation and Sediment Reduction Plan for the Bear Creek Watershed, Humboldt County, California*, prepared by Pacific Watershed Associates.

Associations between landslides, land management practices, geology and physical setting shall be evaluated and likely causal mechanisms for each landslide identified. Sources of information (i.e., air photo, field inspection, etc.) must be cited/provided. Methods of analysis and calculations shall be provided. Data shall be summarized by 1-year, 10-year, and 30-year cycles. This report shall cover, at a minimum, landslides from the 1940s, (or earliest air photos) to 1997. Specific information marked by an asterisk shall be presented on a scaled map, 1-inch = 1000 feet. All other, non-mapped data will be provided in tabular format with entries keyed to landslide identification numbers. Map overlays and electronic (Microsoft Word and Excel Office 97) files of all data shall also be provided. For each landslide, the following information at a minimum shall be presented:

1. Slide Characteristics

- a. Landslide location and identification number*.
- b. Date of slope failure, actual or estimated, date failure was observed, dates of reactivation and current status of the failure (i.e. extent of revegetation, activity, ongoing erosion).
- c. Type of slide, i.e. translational-rotational, debris torrent, etc.
- d. Percent slope and slope aspect.
- e. Topographic setting, including slope characteristics, (i.e. concave, convex, planar, etc) and landform, (i.e., inner gorge, swale, etc.). In the case of swales and gorges the gradient of sideslopes.
- f. Describe profile of soil/rock type(s) from surface to failure plane. Describe failure plane and material below failure plane.
- g. Measured or estimated depth to failure plane.
- h. Attitude and density of structural discontinuities in bedrock, (i.e., faults, fractures, bedding etc.).
- i. Description of local hydrogeologic setting, including evidence of seepage, surface and subsurface flow paths (i.e., flow nets) and expected groundwater depths before failure.
- j. Location of landslide runout path* and measured or estimated landslide runout distances.
- k. Material strength characteristics (measured and estimated) for all soil and bedrock types. Laboratory data sheets will be provided for all measured values and sample locations shown on a scaled map. For estimated material strength characteristics, specific references will be provided.
- l. The Discharger's Geographic Information System (GIS) Mass Wasting Areas of Concern (MWAC) information (maps and tabulated data) shall also be provided.

2. Slide Volume

- a. Total volume and dimensions of slide.
- b. Volume of sediment delivered to watercourses and California Forest Practice Rules Classification of each watercourse receiving sediments.
- c. Volume of sediment that could be delivered in the future to watercourses and California Forest Practice Rules Classification of watercourses.

3. Silvicultural History

As an overlay to landslide location map, identify location of logged units (with identification numbers), silvicultural prescriptions, yarding, road, landings and skid trails which currently exist or which existed in the past*. In a tabular format accompanying map(s), describe silvicultural practices, yarding and site preparation methods, dates of timber harvest and other relevant information for each logged unit and date of construction or reconstruction for each road segment.

4. Causal Mechanism(s)

Describe causal mechanism and contributing factors for each landslide, such as skid trails, road and skid trail watercourse crossings, concentration of runoff, surcharging, undercutting slide toe, etc. Changes related to timber harvesting and land management practices, such as changes in ambient ground water levels, foliar interception loss, evapotranspiration rate and magnitude, and loss of root strength over time shall be described. Describe factors influencing areas at scales broader than individual harvest units, i.e., storms, seismic, etc. separately. Tabulated summaries of landslide volumes per 1-year, 10-year, and 30-year photo-period; landslide rate(s) versus age of harvested slope; by causal mechanism; size and volume delivered and future potential for delivery shall be provided.

B. Remediation Efforts

1. By no later than **January 15, 2001**, the Discharger shall submit a comprehensive report describing efforts to date to remediate past and ongoing sediment discharges from landslides, roads, landings, and other hillslope activities. The report shall describe, in tabular format, all remediation efforts/ soil stabilization projects implemented to date, the date of implementation, the date of completion, and a schedule for remaining activities intended to be carried out by the Discharger. Activities shall be keyed to identification numbers. Any monitoring data obtained to date shall be included and evaluated. These efforts and their locations shall be shown on a scaled map (1 inch=1000 feet). Examples of such efforts include: volume of landslide debris removed from hillslopes or watercourses; onsite soil stabilization; road and watercourse crossing upgrades; and in-channel efforts such as dredging, placement of large woody debris, and bank stabilization.
2. By no later than **May 15, 2001**, the Discharger shall propose a protocol for identifying and prioritizing sites requiring remediation, and a workplan and time schedule for future remediation efforts for landslides, roads and other hillslope activities. The workplan shall propose a format for periodic status reports (to be submitted semi-annually, as discussed below). Status reports should, at a minimum discuss remedial efforts completed over the preceding six-month period and should describe remedial efforts proposed for implementation over the next six months. In addition, status reports should include scale maps (1 inch=1000 feet) identifying past and proposed efforts. The reports shall identify sites contributing sediment but not requiring remediation, and supporting rationale shall be provided.
3. Following approval of the workplan by the Regional Water Board's Executive Officer, the Discharger shall implement the workplan for ongoing remediation efforts/soil stabilization efforts, by a deadline to be specified in the approval letter from the Executive Officer.

C. Remediation Effectiveness

1. By no later than **July 15, 2001**, the Discharger shall submit a draft workplan and implementation schedule to evaluate the effectiveness of ongoing remedial actions/erosion control improvements in reducing sediment generation from representative sites. At a minimum, the following information shall be provided: 1) Inspection frequencies based on site priority, 2) Rate and volume of sediment discharges from each site before remedial actions and data used to calculate volumes, 3) Estimated future sediment generation/volume without remedial actions and data used to calculate these volumes, 4) Rate of sediment discharge after remedial actions and data, 5) Volume of sediment saved, per year and total lifetime of site, 6) Short term effectiveness of remedial actions, 7) Anticipated long-term effectiveness/permanence of the remedial activities/erosion control measures, and 8) a photographic record of each site before and after remediation.
2. Following approval by the Executive Officer, but no later than **October 15, 2001**, the Discharger shall submit a final workplan required by C.1, above.
3. Following approval of the workplan by the Regional Water Board's Executive Officer, the Discharger shall implement the workplan for ongoing remediation efforts/soil stabilization efforts, by a deadline to be specified in the approval letter from the Executive Officer.

D. Instream Trend Monitoring

1. By no later than **February 15, 2001**, the Discharger shall submit a draft instream trend monitoring plan and implementation schedule which adds the following water quality monitoring component to the Discharger's existing monitoring efforts:

"Track and evaluate changes in instream water quality including, but not limited to, turbidity, suspended sediment, and temperature."

This monitoring plan shall include data quality objectives, QA/QC protocol, sampling locations, sampling frequencies, and defined statistical performance parameters (coefficient of variation, confidence interval, etc.) necessary and data analysis methods. The plan shall be presented in a similar format and to the same level of detail as that contained in the final monitoring plans for North Fork Elk River and Bear Creek, dated June 1998 and April 1998, respectively.

Monitoring shall continue until it can be demonstrated that instream water quality is in compliance with water quality objectives, and that the beneficial uses have been restored.

2. By no later than **May 15, 2001**, the Discharger shall submit a final in-stream monitoring workplan and implementation schedule.

3. Following approval of the workplan by the Regional Water Board's Executive Officer, the Discharger shall implement the workplan for ongoing remediation efforts/soil stabilization efforts, by a deadline to be specified in the approval letter from the Executive Officer.

II. **Report of Waste Discharge**

If the Discharger proposes to remove trees at a rate of more than 1.5% of the Discharger's Bear Creek ownership (72.75 acres) per calendar year, the Discharger shall submit to the Regional Board a Report of Waste Discharge at least 120 days prior to commencing harvest at rate in excess of 1.5%. The Report of Waste Discharge shall include:

A. Landsliding Potential

1. A detailed workplan and implementation schedule to investigate the relationship between changes in hillslope stability and timber harvesting, hillslope management practices, and changes to runoff and drainage patterns for shallow and deep-seated landslides. In developing the workplan, the Discharger shall consider information including, but not limited to:
 - * Material properties and lithology.
 - * Historic landslide occurrence and their casual mechanism(s).
 - * Probability distribution of rainfall magnitudes, duration and rates expected at the project site. Stability must be calculated for 10-yr, 25-yr and 50-yr reoccurrence interval storms and annual rainfall.
 - * Measured evapotranspiration and foliar interception rates and magnitude for forest stands of different age.
 - * Changes in the physical setting over time due to proposed activities, such as changes in root strength, compaction etc. as function of time, post harvest, and tree types.

At a minimum, the Discharger shall submit a workplan containing the following:

- i. Proposed methodology to develop a Factor of Safety (FOS) Threshold Range (1.2 to 1.5) for all hillslopes within the Discharger's ownership that must not be exceeded, in order to prevent management-related landslides. The threshold range shall be adjusted to reflect sensitivity of human and natural resource receptors, and rationales for such adjustments. Describe methodology used to apply the Infinite Slope Equation (ISE) for shallow-seated landslides at specific sites. For all input parameters, present the range of values from site specific data or cite literature references. Sensitivity analysis for each parameter in FOS calculations shall be conducted and provided. Identify which parameters are most sensitive and justify the value, or range of values, selected for each input parameter. Calculations of the FOS shall consider natural variability within hillslopes and geologic formations (i.e., where variability is significant, the estimated value shall be selected to provide a 95% confidence that the FOS is not lower than the calculation). The FOS(s) threshold values for fully forested conditions, background conditions and the current FOS distribution shall be plotted on scale maps (1-inch=1000 feet) and overlays of surface contours, watercourses, and the Discharger's MWAC maps shall be provided.
- ii. Proposal to evaluate hillslope stability (for shallow-seated landslides) on a project specific basis (i.e. timber harvesting activities, road and landing

construction, quarries) and determine FOS values across the project area for pre- and post-management conditions. Post harvest conditions shall be modeled as a function of time. Analysis shall be performed over 1, 5, 7, 10, 15, 30-years and life of HCP (50 years) for all timber harvest plans and hillslope activities. Multiple analyses shall be conducted for hydrologic conditions expected during 10-year, 25-year and 50-year reoccurrence intervals.

- iii. Proposed process to compare site-specific pre-harvest and post-harvest FOS distributions against FOS Threshold Ranges, from C.1 above, in order to identify hillslopes that must be avoided, or timber harvesting-related practices that must be modified or avoided, based on exceedance of FOS Threshold Values.
- iv. Proposed investigation and implementation schedule to quantify magnitude and distribution of ground water elevations through at least one hydrologic cycle prior to, and five to seven hydrologic cycles following, implementation of various timber harvest activities.

B. Timber Harvest Plan Compliance Monitoring

1. A draft monitoring proposal and implementation schedule for each timber harvest plan to evaluate compliance of those timber harvest plans and their related activities, including watercourse crossings, with the water quality objectives and prohibitions contained in the Basin Plan. The monitoring program shall employ a design that has the statistical power to detect changes in turbidity and suspended sediments of 20% above natural background with 90% confidence for watercourses which can be potentially impacted by timber harvesting and related activities.

The monitoring program shall propose methods to obtain the following information:

- i) Natural background rating curves for turbidity and suspended sediment as a function of flow rate.
- ii) Ambient/pre-harvest conditions for turbidity and suspended sediment in relation to background.

Note: The Discharger shall implement the background and ambient/preharvest monitoring components prior to commencing timber harvest operations.

- iii) Active and post-harvest monitoring of turbidity, suspended sediment and stream flow to measure compliance with water quality objectives.
2. Pre, during, and post- harvest monitoring shall include measurements during base flow and significant storm events to enable a statistically valid description of instream water quality.

3. The compliance monitoring shall continue until it can be statistically demonstrated that instream water quality is in compliance with Water Quality Objectives, and timber harvest related disturbed areas no longer pose a threat to water quality.

If, in the opinion of the Executive Officer, the Discharger fails to comply with the provisions of this Order, the Executive Officer is authorized to request the Attorney General to take an enforcement action against the Discharger, in accordance with Sections 13331 and 13350 of the California Water Code. This would include an injunction and/or civil liabilities.

Certification

I, Craig Johnson, Assistant Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, North Coast Region, on November 16, 2000.

Craig Johnson
Assistant Executive Officer